

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



Reserve  
aQC877  
.5  
.S27  
1999

# Saving Lives

---

*With an All-Hazard  
Warning Network*

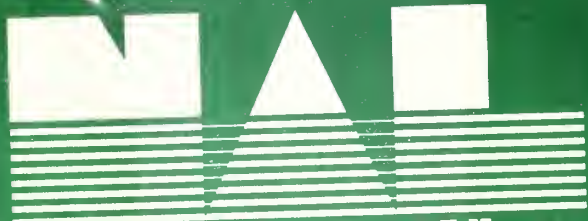
United States Department of Agriculture

Federal Emergency Management Agency

United States Department of Commerce



**United States  
Department of  
Agriculture**

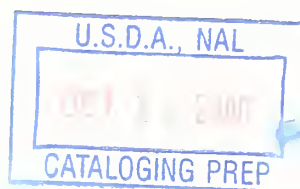


**National Agricultural Library**

# Contents

GPO  
Depository  
Library  
Program

 The Opportunity .....	2
Section I — The Report .....	5
Section II — Recommendations .....	29
Appendix .....	30
— Internet Sites .....	34
— Companies That Manufacture or Market NOAA Weather Radios .....	35
— List of Acronyms .....	37
— Acknowledgments .....	38



Double tornado.

Cover photo: USDA

# Saving Lives

## *With an All-Hazard Warning Network*

*Each year, thousands of people die, are injured, or lose property because they didn't know soon enough about hazards, disasters, or emergencies. Our 24-hour warning network - NOAA Weather Radio - can help save lives and serve as an all-hazards network. We're also developing new technologies for the future that can alert the public about hazards, disasters, and emergencies.*

### **The Opportunity**

#### **Dear Mr. Vice President:**

When people know disasters are coming, they act. They can save lives, reduce damage and suffering, and speed recovery. Technological advances are improving our forecasting ability every day. More warning gives us more time to prepare. Minutes are important when thunderstorms, tornadoes, tsunamis, wildfires, and flash floods are approaching. Hours and days of extra time can help us get ready for hurricanes, winter storms, high winds, and volcanic eruptions.

In addition to improving access to warnings, we must make the warnings themselves better. They must be timely, accurate, and targeted only to those in harm's way. When we warn people and an event doesn't happen, they may be less likely to heed the next warning.



*After the 1900 hurricane, only a few houses were left standing on the southeast side of Galveston, Texas. Photo courtesy of the Rosenberg Library, Galveston, Texas.*

At the turn of the century, we got very little notice. In 1900, one hurricane killed 6,000 people when it hit Galveston, Texas - the worst loss of life from a natural disaster in U.S. history. Now we usually get several days to get ready for hurricanes. During the past 10 years, an average of 23 people died each year in the United States because of hurricanes. Any deaths are too many.

We usually think of "Tornado Alley" - particularly the Great Plains - as the area where tornadoes do the most damage. But tornadoes can strike anywhere.

- On Palm Sunday, March 27, 1994, killer tornadoes left trails of devastation as they raced northeastward from north-central Alabama and northern Georgia to the Carolinas. These storms killed 42 people and injured 320. Property damage was estimated at \$107 million.
- Sixteen tornadoes tore through Arkansas and western Tennessee on March 1, 1997, killing 26, injuring hundreds, and producing an estimated \$115 to \$120 million in damages.
- In late February 1998, seven tornadoes swept through east-central Florida during the night, killing 42 and injuring more than 260. It was the deadliest series of tornadoes in the state's history — causing more than \$100 million in damages.



- On the afternoon of April 16, 1998, a series of tornadoes struck downtown Nashville, Tennessee, leaving a wide swath of damage, valued at \$120 million. Because citizens were warned, they were able to take cover. Only one person died.
- In May 1998, the town of Spencer, South Dakota, was literally wiped off the map by tornadoes that destroyed 90 percent of the buildings. Six people were killed, and 150 injured. Property damage totaled \$18 million.

Even though tornadoes were particularly deadly in 1998, January 1999 set new records.

- During January 1999, 163 tornadoes struck. That was more than three times as many as the previous monthly record for January of 52 tornadoes set in 1975. Most of the January tornadoes - 141 - were in Arkansas, Louisiana, and Tennessee. On just one day - January 21 - 87 tornadoes struck, which set a new record for that date. The first tornado death of 199 occurred 40 minutes after midnight on January 2, and the total number of deaths had risen to 18 by month's end.



The 10 most costly natural disasters ever in the United States have all happened within the past 10 years. Many scientists believe we're entering a weather cycle that will give us even more violent storms, making the likelihood of a disaster even greater. By 2010, more people will be vulnerable in coastal areas because about 74 percent of the U.S. population will live there. Scientific evidence shows that the frequency and intensity of storms may be affected by variations in climate. For example, 1998's El Niño split the jet stream and changed normal storm patterns.

Natural disasters that we once thought happened only once in a century now seem to be happening more often — burdening communities by killing people and causing property damage that the insurance industry estimates costs billions of dollars every year. The four most costly hurricanes in U.S. history happened within the last 6 years. Total insured and uninsured losses from Hurricane Georges and Mitch in 1998 will end up reaching more than \$2 billion, according to the insurance industry. This makes it more important than ever that warnings be issued and heard.

Our agencies are committed to saving lives, reducing damage and suffering, and speeding recovery by working together to implement the recommendations in this report.

Sincerely,

Dan Glickman, Secretary of Agriculture  
James Lee Witt, Director, Federal Emergency Management Agency  
William Daley, Secretary of Commerce

# Section 1 — The Report

## How You Probably Get Your Weather Warnings

Today, the National Weather Service (NWS) can give you about 12 minutes to get ready for a tornado - more than double the 5 minutes you had 10 years ago.

You're probably used to getting warnings about severe weather over the radio or on TV. Just about all areas of the United States are covered by regular radio and television signals. Nearly all radio and television broadcasters get emergency warnings from the National Weather Service for severe weather and other hazards.

### NOAA Weather Radios

You can also get warnings about severe weather 24 hours a day directly from the National Weather Service over a National Oceanic and Atmospheric Administration (NOAA) Weather Radio.

For less than the cost of a new pair of shoes, you can have your own weather radio. If you're sleeping, it can wake you up to give you specific warnings for your location. It will give you instant access to the same weather reports and emergency information that meteorologists and emergency personnel use - information that might save your property and, more importantly, your life.

### Can Just a Few Minutes of Warning Save Lives? You Bet!

In July 1997, more than 3,000 people had turned out in Lancaster, Ohio, for an outdoor concert. When the National Weather Service issued a severe



*Survivors pick through wreckage near a house knocked off its foundation by 1900 hurricane in Galveston. Photo courtesy of the Rosenberg Library, Galveston, Texas.*



thunderstorm warning for the area, it automatically came over the 50 public works walkie-talkies in the field. Organizers had time to cancel the event and evacuate the field. The result? No one was hurt except for a few people who were still in the parking lot when lightning struck a car.

On April 4, 1997, at 4:52 p.m., the National Weather Service issued a tornado warning that included the small community of Shongaloo, Louisiana. The principal of the local high school was the only person in the school building at the time. He knew about the tornado because his weather radio had sounded an alarm. His wife also had a weather radio at home and called to tell him of the approaching storm. By the time the tornado hit Shongaloo at 5 p.m. - only 8 minutes later - the principal had taken cover and was not injured. Even if the tornado had struck during school hours, eight minutes is still enough lead time to move students to a safe place in the building.

In January 21, 1999, a NOAA Weather Radio alerted the Superintendent of the Beebe, Ark., school district to monitor a strong line of thunderstorms heading toward his campus. When he later halted a regional basketball game and evacuated the 300-400 fans and players from the gymnasium, some fans were upset. But, when a tornado struck and completely destroyed the gymnasium a half-hour later, no lives were lost.

And, on May 3, 1999, when the shift supervisor at Norland Plastics in South Haysville, Kansas, received a tornado warning from the plant's NOAA Weather Radio, he didn't want to make the staff nervous. So, he conducted a mock tornado drill and sent all 85 workers to the basement. The tornado destroyed most of the plant, but didn't injure any employee.

NOAA Weather Radios come in many different styles. Most have battery backup and feature a warning alarm. Most marine radios and scanners and many CB radios and AM/FM radios offer the feature. Newer models are self-activating and automatically sound an alarm when a warning is issued for your county. They can be tuned to one of seven different frequencies. The NOAA Weather Radio Network broadcasts NWS forecasts and warnings 24 hours a day.

There is a list of companies that manufacture NOAA Weather Radios in the appendix. When choosing which weather radio to buy, you should consider whether more expensive features - such as a radio that turns itself on for warning in the middle of the night - are important to you.

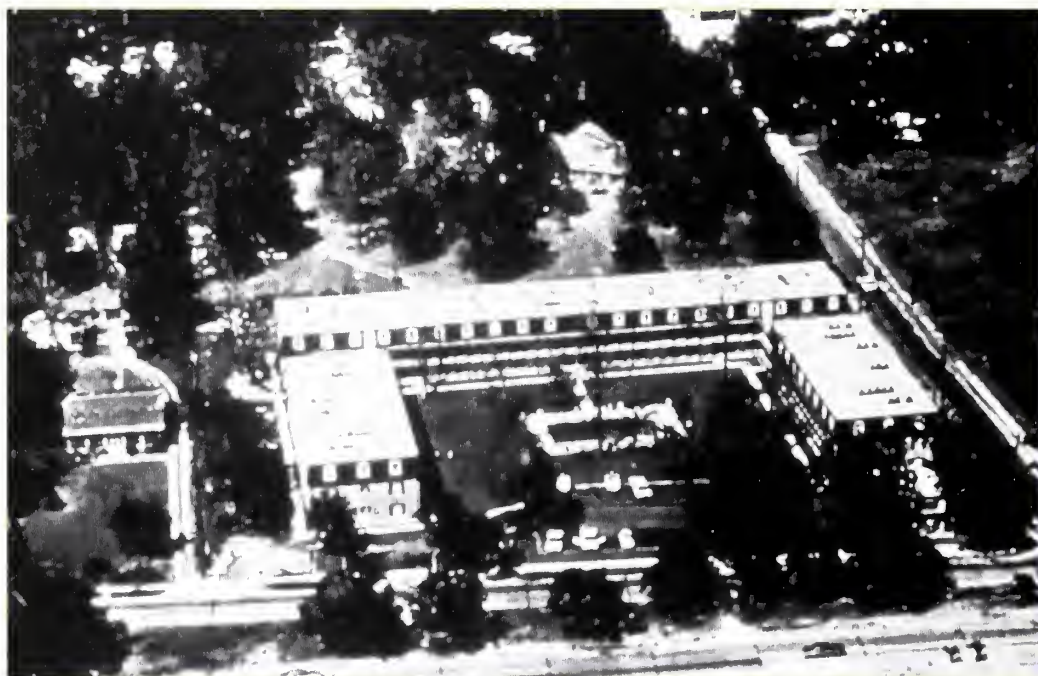
### **Are You Covered?**

You may not be. You can't hear NOAA Weather Radio unless your area is covered by a transmitter and you have a receiver.

The maps and charts in this report are computer predictions suggesting that, currently under ideal conditions, about 90 percent of the population — a little over 245 million people — can receive signals from the more than



States where computer-predicted coverage is already 95 percent include: Alabama, California, Connecticut, Florida, Illinois, Indiana, Kentucky, Massachusetts, Maryland, Mississippi, New Jersey, New York, Rhode Island, and South Carolina. Actual coverage may be lower by about 10 percent.



*Richelieu Apartments, before and after storm surge damage, Hurricane Camille (Category 5), Mississippi, 1969.*

The NOAA Weather Radio website is <http://www.nws.noaa.gov/nwr>. You can check this website to see if you are covered by a NOAA Weather Radio signal. The site also includes the most recent list of companies that make receivers. The National Weather Service does not endorse any particular make or model of NOAA Weather Radio receiver.

All-Hazards/Weather Emergency Alert Monitors have been commercially available since the early 1970's. An estimated 8 million units have been sold. That means each radio would have to reach about 30 people — hardly enough to give adequate warnings.

At a minimum, communities need receivers in schools, day care centers, hospitals, places of worship, restaurants, grocery stores, recreation centers, bus and train stations, office buildings, sports stadiums, theaters, retail stores, and airports. A number of partnerships have been formed to get NOAA Weather Radios into schools and other public areas.

### **How is NOAA Weather Radio Different From the Emergency Alert System?**

The Emergency Alert System (EAS) was designed as a joint government-industry message system. It permits the President to speak to the entire Nation in times of national emergency. The EAS replaced the Emergency Broadcast System in 1994.

NOAA Weather Radio is an integral part of the EAS system. Warnings issued via NOAA Weather Radio can be automatically rebroadcast by radio and TV stations, but their participation is voluntary. However, this capability of NOAA Weather Radio makes it invaluable in getting hazard warnings out. Not only is there a direct link to the public, but there is a direct link to any technology that can receive the NOAA Weather Radio signal.

Commercial broadcasters and cable stations receive hazard warnings from many sources, including NOAA Weather Radio. Commercial broadcasters and cable stations can choose to rebroadcast any or all warnings they receive with their EAS compatible equipment.

All broadcast stations must have Emergency Alert System (EAS) equipment. Beginning December 31, 1998, the FCC began requiring the 1,219 cable systems with 10,000 or more subscribers to have EAS equipment. Broadcasters and cable operators monitor National Weather Service alerts directly on their EAS equipment. They aren't required to transmit State and local warnings, but many do - they send warnings either as emergency announcements or as messages after the EAS digital signal.



## **Vice President Gore's 1994 Initiative To Make Weather Radios as "Common as Smoke Detectors"**

On March 31, 1994, Vice President Al Gore surveyed the devastation from violent storms and tornadoes in Cherokee County, Alabama, and announced a new initiative to "provide access to warnings of potential disasters - early warnings - for everyone, everywhere in the Nation." His goal was to make the inexpensive NOAA Weather Radios as "common as smoke detectors."

Vice President Gore established a task force to promote and establish public/private partnerships with corporations, associations, and local governments to fund enough new NOAA Weather Radio transmission stations to cover 95 percent of the population. The task force is composed of experts from the U.S. Department of Agriculture (USDA), National Oceanic and Atmospheric Administration (NOAA), and Federal Emergency Management Agency (FEMA).

USDA's Rural Electrification Agency (now Rural Utilities Service) asked its clients to find free space on existing radio towers at rural electric and telephone cooperative sites. The Service also asked clients to promote the purchase and donation of transmitters by cooperatives.

The growth in the NOAA Weather Radio network has been funded largely through the efforts of partnerships and cooperation with other Federal, State and local government agencies. Since 1994, more than 100 new stations have been added to the network using a variety of local, state, and Federal monies and through public/private partnerships with corporations, electric cooperatives, and community groups.

The results have been encouraging, but expansion has been slow.



*Storm surge damage, Hurricane Hugo, Roosevelt Roads Naval Base, Puerto Rico, 1989. Photo courtesy of Don Wernly.*

## **NPR's Involvement**

In 1998, Vice President Gore's National Partnership for Reinventing Government (NPR) selected the National Weather Service as a high-impact agency - one of 32 agencies whose leaders were committed to making small but significant, concrete measurable goals that could be achieved over 3 years. NPR works with these agencies to help them transform themselves, to focus on customers and on getting results that matter to Americans.

To help save lives by providing quicker warnings of rapidly approaching violent weather, NPR brought together representatives from more than a dozen federal agencies, including:

- Office of the Vice President
- Office of Management and Budget
- Federal Emergency Management Agency
- Federal Communications Commission
- U.S. Department of Agriculture
- Department of Commerce's National Weather Service, National Oceanic and Atmospheric Administration, and National Telecommunications and Information Administration
- U.S. General Services Administration
- U.S. Geological Survey
- Office of Science and Technology Policy
- Department of Transportation

Representatives from these agencies formed a multi-agency working group with the intent to save lives; the group is working to do this by finding combined solutions to give people better, faster, and more effective hazard warnings.

The working group found that NOAA Weather Radio forms the backbone of an all-hazard system. But to reach the goal of providing coverage to 95 percent of the U.S. population, additional transmitters and receivers are needed.



*Vice President Al Gore*

---

The National Weather Service, working together with the other agencies, has identified the key locations for new transmitters to extend coverage. These locations are primarily in rural areas. USDA has identified a number of RUS electric and telecommunications borrowers who have existing towers that may be suitable for installing transmitters. The U.S. General Service Administration is working to get receivers in locations where Federal employees work. The interagency group is working to leverage existing funds to provide additional transmitters and will save lives by assuring that people are given more adequate warnings of violent weather.

The technological explosion of the past 10 years is fostering new and innovative ways to bring warning messages to the public. To reach as many people as possible, we will need to use all means available to provide a better, faster, cheaper, and more effective all-hazard warning system for the future.

Existing and future partnerships between government agencies and public and private groups will assure that weather, hazard, and emergency warnings are provided through the many forms of communication available to consumers as the nation's information systems continue to develop and expand.

### **Technology for the Future**

Tomorrow's all-hazard warning system will be "smart."

Your television set, your pager, or your receivers will tell you exactly how far away a hazard is and how soon a disaster will strike. Not only will you get warnings that are quicker and more accurate, but you'll know about more disasters.

Some systems will turn themselves on to warn you. And, to be certain you have it, you'll probably receive the message from several different places. You might get a self-activated warning from your cell phone, your TV, your car radio, or even from a "call warning" call on your regular telephone. You'll know about hazards whether you are home, in your office, in your car, at school, in a hospital, at a shopping mall, or even in your place of worship. If you are hearing impaired, a vibrator could go off under your pillow when you're asleep.

It will be up to you, the individual user, to choose what information you want (tornadoes, severe thunderstorms, flash floods, high winds, chemical spills, or radiation hazards), whether you want to be awakened in the middle of the night, and other details. You might even be able to put in a profile so you'll know about tornadoes where your grandmother lives.

The information will come in a very small stream of digital bits of information - hundreds of bits on a very small official and secure bandwidth. It will be available on a variety of receivers - radios, televisions, telephones, and pagers. Many of the receivers will be equipped to turn on when they get the

---

signal, sound a warning tone, set the volume, and give the message. Mobile receivers will know where they are and sound alarms for events only in that area.

The kinds and amount of information that will be available tomorrow are limited only by our own imaginations. It will include space weather, forest fires, hurricanes, chemical spills, terrorist incidents, Year 2000 problems, civil unrest, earthquakes, tsunamis, landslides, volcanic eruptions, or even major traffic accidents.

One of the first and most important initiatives of the Clinton-Gore Administration was a commitment to build an advanced National Information Infrastructure - the "information superhighway." More than a single technology, the information superhighway includes many communications networks, computers, data bases, and consumer electronics, all of which have the potential to change how people live, work, and interact.

A number of promising examples of technological advances made possible by the information superhighway already hold promise for the future - and new advances are being made almost on a daily basis. As people become more "weather aware," they will want and need more hazard warnings.

**The Internet** — We're already using the Internet to talk to each other and share information on virtually any subject. Over 100 million people worldwide have access to the web - up from 40 million at the end of 1996 and



only a handful 5 years ago. Internet traffic doubles every 100 days, according to the U.S. Department of Commerce. Access to the Internet is so vital to students and the public that both President Bill Clinton and Vice President Al Gore are committed to getting every school, library, and hospital connected to the Internet.



The Internet makes information about weather emergencies and other hazards widely available instantly. Many websites already provide weather and hazard information. For example, earthquake information is now posted within 10 seconds of the event to help guide response and recovery. Weather and flood warnings are available at the National Weather Service website. Most local television stations and national television networks have websites with local and national weather conditions and radar maps from the National Weather Service. The U.S. Geological Survey provides real-time water, land, and stream flood data over the Internet for more than 4,000 locations along the nation's major rivers.

### Categories of Tornado Intensity

The size of a tornado does not indicate its intensity. Tornadoes are ranked according to their damage, according to the Fujita Scale, which is very subjective:

**F0:** Gale tornado. Winds of 40-72 mph; some damage to chimneys; breaks branches off trees; sign board damaged.

**F1:** Moderate tornado. Winds 73-112 mph; moving autos are pushed off the roads; attached garages may be destroyed; mobile homes pushed off foundations or overturned; surface of roofs peeled off.

**F2:** Significant tornado. Winds 113-157 mph; considerable damage; roofs torn off frame homes; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light objects become airborne missiles.

**F3:** Severe tornado. Winds 158-206 mph; roofs and some walls torn off well built homes; trains overturned; most trees in forests uprooted.

**F4:** Devastating tornado. Winds 207-260 mph; well-built homes leveled; buildings with weak foundations blown off some distance; cars thrown through the air.

**F5:** Incredible tornado. Winds of 261-318 mph; strong frame homes lifted off foundations and carried considerable distances; car-sized items become missiles and fly through the air in excess of 100 meters; bark stripped from trees.

**F6:** Inconceivable tornado. Winds of 319-379; very unlikely. The small area of damage produced would probably not be recognizable from the wreckage produced by F4 and F5 winds.

During an emergency, there often isn't enough time to look for information on the Internet. Because most people still connect via phone lines, the Internet is subject to the same interruptions as the telephone system, especially after a disaster strikes. At least one Internet provider has begun providing emergency warnings to its customers. Something as simple as an e-mail directed to a specific address —



*Storm damage.*

possibly a classroom or a government building — could give enough warning to save lives. For example, television station WJLA (Channel 7) in Washington, D.C., has begun offering an e-mail service that sends subscribers information about upcoming news stories and severe weather and school closings.

The Internet and other advanced technologies will become even more important over time. Because we are living through a “digital revolution,” the lines between communications technologies are beginning to blur. Digital television may become very similar to your computer, and it may soon be possible to program your television set to receive warnings or to get warnings on your computer screen.

### Five Categories of Hurricanes

Hurricanes are ranked 1 to 5, according to the Saffir-Simpson scale of strength:

**Category 1:** Hurricane has central barometric pressure of 28.94 inches or more and winds of 74 to 95 mph. It is accompanied by a 4- to 5-foot storm surge and causes minimal damage.

**Category 2:** Pressure 28.50 to 28.93 inches, winds from 96 to 110 mph; storm surge 6 to 8 feet, damage moderate.

**Category 3:** Pressure 17.91 to 28.49 inches, winds from 111 to 130 mph, storm surge nine to 12 feet, damage extensive.

**Category 4:** Pressure 27.17 to 27.90 inches, winds from 131 to 155 mph, storm surge 13 to 18 feet, damage extreme. Hurricanes Andrew, Hugo, Hazel, and Floyd were Category 4 storms.

**Category 5:** Pressure less than 27.17 inches, winds greater than 155 mph, storm surge higher than 18 feet, damage catastrophic. Hurricanes Mitch, Gilbert, and Camille are examples of Category 5 storms.

---

**Emergency Managers Weather Information Network** — The Emergency Managers Weather Information Network (EMWIN) is a system that transmits live weather information to computers across the U.S. and over most of the Pacific Ocean. The National Weather Service gathers live weather and emergency information from sources across the globe and the EMWIN system broadcasts that data via satellite, radio, and the Internet. Computers can use the satellite downlink to access a stream of real-time weather information from NOAA's Geostationary Operational Environmental Satellites, GOES-8 and GOES-10.

Emergency management groups and municipal agencies retrieve the EMWIN data from satellite and retransmit it through local radio frequencies. Anyone within a 40 to 50 mile range of the transmission signal can access that data on their computer screen. Agencies can tailor the information to fit their specific area. In some small island countries, it is the most reliable way to get forecasts and warnings.

You can access EMWIN information on the Internet Weather Information Network at: <http://iwin.nws.noaa.gov>. Choices include enhanced graphics, including radar and satellite images, plain text, and alarms. You can configure your computer to trigger alarms for specific hazards. Some alarm features are: automatic activation of lights, sirens, printers, pagers, or e-mail. The alarm feature makes the system ideal for people on the go, people who are disabled, people in emergency management operation centers, or anyone else who needs timely information about weather and emergency situations. The popularity of this website is growing - it averages more than 40 million hits each month, and, during major weather events, can field more than 2 million a day.

**Pagers** — Modern pagers can be used to transmit limited warning information. Paging systems cover 80 to 85 percent of the country. They are largely land-based and use their own tower sites or the subcarrier signals of broadcast stations. The sites are usually linked by satellite. FCC field tests of new alerting technologies in 1993 demonstrated that paging systems can interface with NOAA Weather Radio and EAS to give timely warning messages on pagers. Paging system participation in EAS and in the retransmission of NOAA Weather Radio warning messages is voluntary.

An example of what today's paging systems can do without any new technology can be seen in Tulsa, Oklahoma, where there are often severe weather conditions. The Tulsa area Emergency Management Agency (TEMA) teamed up with AT&T Wireless Services, Inc., to create a service that warns pager customers of tornadoes, severe thunderstorms, flood warnings, or problems with hazardous substances. Covering only Tulsa County, the service is modeled on the paging system that local police use to immediately alert the news media. Each warning has a different code: 912 means a tornado; 913 a severe thunderstorm; 914 a flood; and 915 a hazardous materials incident.

TEMA hopes this service can be made available through other pager services in Tulsa. Although this is not a high-tech solution, and it doesn't provide detailed information, it shows what can be done to reach more people.

In the future, more sophisticated systems using pagers will send out warnings more efficiently to larger audiences. At least one company has worked with a major communications equipment manufacturer to send messages to residents on their pagers or cell phones.

**Cell (Wireless) Phones** — Wireless, or cell, telephone systems also cover 80 to 85 percent of the country, with over 63 million cell phones in operation in the United States. Most communities have two cellular phone providers. Low-orbital-satellite communications systems will also provide portable phone service to many places in the future. Personal Communication Service (PCS) coverage is increasing rapidly across the country. Some technological barriers preclude cellular telephone systems from interfacing with EAS and NOAA Weather Radio to provide their users with timely warning messages. Cellular telephone participation in EAS and in the retransmission of NOAA Weather Radio warning messages is voluntary.

Cell communications equipment typically has a range of 10 miles for analog signals and 3 miles for digital ones. The technology exists to broadcast to cellular phones within a cell so that, for example, you could track a tornado through a region, alerting only those within specific cells.

In some areas of the country, it is possible to get weather information through a "short messaging" service that already broadcasts other information, such as news headlines or stock quotes. The information is displayed on the phone's handset. Currently, however, the information is not targeted to a specific geographic area.

The wireless industry is developing technical standards that may be available soon to deliver emergency messages to cellular and personal communications services phones within the range of one tower. This would be "short messaging" technology directed to a specific targeted area. However, this technology may require customers to purchase new handsets.

**Call Warning** — At least two companies - Telcordia Technologies of Red Bank, N.J., and SCC Communications of Boulder, Colorado - have devel-

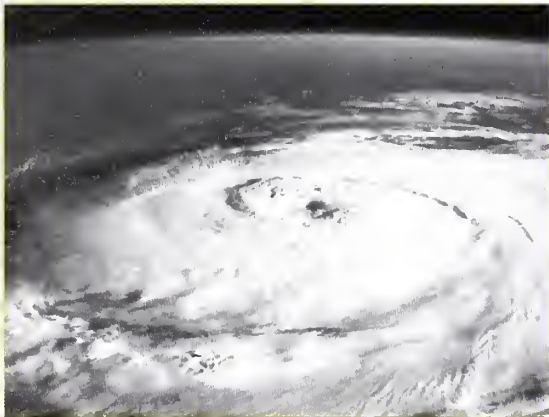
oped and tested a technology to use telephones to identify and warn people within minutes of an impending emergency. SCC's system makes up to 2,000 telephone calls per minute to designated areas. In 1998, SCC conducted a trial in conjunction with U S West, the City and County of Boulder, and the University of Colorado as part of the area's



annual flood preparedness exercise. Designed to try calls three times if the line is busy or there is no answer, the system attempted to deliver a 40-second voice message to 863 numbers, mostly university residents. The first round of calls delivered all or part of the message to almost 80 percent of the numbers within 12 minutes.

A system like this has the potential to complement warnings delivered in other ways. It may not be feasible for all situations. Even 12 minutes may not be adequate warning for some emergencies. And while this system may give advance warning, phone lines may become congested or inoperable after a major weather event, requiring customers to turn to NOAA Weather Radio or other disaster information sources.

**Tomorrow's TV** — While today's television sets provide emergency alerts through the EAS, tomorrow's digital TVs, which will soon be available to consumers, will do even more. Broadcasters will probably continue to serve the public's interests as they have always done, with weather coverage and alerts including special bulletins and a stream of text warnings crawling along the top or bottom of the screen.



*Hurricane. Photo courtesy of NOAA.*

The new digital televisions will give broadcasters more ways to deliver information. In many ways, High Definition TV (HDTV) will be like a computer, receiving and processing a great deal of information in digital form. Weather and other hazard information would be a relatively small part. Warnings can also come from the TV receiver itself. Manufacturers could build a sophisticated technology to provide a visual or audio alert, a warning light or chime, or to turn the set on and adjust the volume.

Norman Ornstein, co-chair of the Advisory Committee on Public Interest Obligations of Digital Television Broadcasters, said recently that the amount of the radio spectrum needed for this purpose would be "the equivalent of a human hair across a superhighway." This advisory committee's report recommends that broadcasters work with appropriate emergency communications specialists and manufacturers to determine the most effective way to transmit disaster warning information.

**On the Road** — The transportation system of the future will undoubtedly use much of the communications technology already being designed today. Some automobiles already have "on board" computer mapping systems to direct you to your destination. Future guidance systems that use the Global Positioning System (GPS) could also contain a hazard warning system.

The Department of Transportation includes systems like this in its Intelligent Transportation System (ITS) programs. In addition to information on the Internet, telephone and cell phones, many cities and states already provide "real time" information to people who are traveling by using the Radio Broadcast Data System (RBDS) and programmable message signs on the roadways.

The ITS program also supports developing a new standard so that you can get travel and weather information on specially equipped car radios. FEMA and NWS are looking at systems to let broadcasters use a part of an FM radio channel - the FM subcarrier - to broadcast severe weather warnings to homes and vehicles. FM stations throughout the country could carry weather warnings continuously without interrupting their regular programming. Phoenix, Seattle, and San Antonio already have pilot systems in place.

Digital codes can turn on receivers, set the volume, stop a tape cassette or compact disc, and issue a warning. Radio Data System (RDS) is transmitted by most FM stations in Western Europe, and car radios with RDS functions are available from 50 different European manufacturers. In the United States, a slightly modified RDS called RBDS (Radio Broadcast Data System) can interrupt programming only for those listeners with the appropriate receiver. General Motors began offering RBDS receivers in 1998 in some of its Cadillacs.

**On the Water —** There are almost 70 million recreational boaters in the United States, and numerous commercial marine-based crews. At any time, a substantial portion of these mariners are using our nation's waterways. The United States Coast Guard, in close cooperation with NOAA's National Weather Service, not only re-broadcasts weather forecasts daily using its maritime VHF-FM National Distress System, but also actively re-broadcasts severe weather warnings as they happen, using the same system. These forecasts and warnings are an integral part of the Maritime Safety Information System and the marine community relies on this Coast Guard service. Nearly all marine radios can receive NOAA Weather Radio. More sophisticated receivers scan for alerts and then switch to an alarm mode when they receive one.

**Disability Issues —** Once a receiver gets an emergency warning, it can turn on alarms, lights, vibrators, and other devices to alert people with special needs. The possibilities are limited only by our imagination and our ability to build commercially viable equipment.

In Joliet, Illinois, hearing-impaired residents can now get warnings about thunderstorms and other weather dangers through an emergency pager program. The city provides free pagers to those who submit medical proof of hearing loss, such as doctor's notes. Vibrating pagers transmit warnings and a code indicates the type of weather emergency in effect. Joliet previously warned hearing-impaired residents through friends, relatives or radio.

Local chapters of Americans With Disabilities can provide additional information. Their website is: <http://www.eeoc.gov>.



*Cars stranded after a Colorado snowstorm. Photo courtesy of Jim Wiesmueller.*



**NOAA  
Weather  
Radio-1999**



Source: Signal Coverage, Institute for Telecommunication Sciences; Boundaries, USGS; NWR Towers, NWS

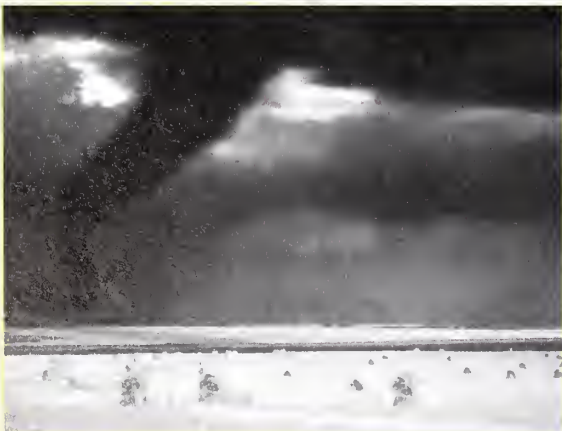
Prepared by U.S. Geological Survey - 1999

## What is the Federal Government Doing Now?

Disasters are an expensive and growing problem. The Federal Government is working to save lives and to stem the rapid rise in the costs of coping with disaster. Insurance companies estimate that these disasters cost the United States billions of dollars a year, and costs continue to rise. Many scientists are worried that we're entering a climate cycle with more violent storms that could involve thousands of people and cause much more damage.

For example, since 1992:

- Hurricane Andrew caused \$30 billion in damages in 1992
- Midwest floods caused \$20 billion in damages in 1993
- The Northridge earthquake in California caused \$42 billion in damages in 1994;
- Severe weather and floods in Texas, Oklahoma, Louisiana, and Mississippi caused \$5.5 billion in damages in 1995
- Hurricane Marilyn caused \$2.1 billion in damages in 1995
- Hurricane Mitch caused an estimated \$2.1 billion in damages in central America and the United States in 1998.
- The southern plains drought caused \$4 billion in damages in 1996
- Hurricane Fran caused \$5 billion in damages in 1996
- Hurricane Bertha caused \$270 million in damages in 1996
- The winter blizzard of 1996 caused \$500 million in damages
- Red River floods in North Dakota and Minnesota caused \$4 billion in damages in 1997
- Preliminary figures from 1998's Hurricane Georges show it killed 350 people and total insured losses could end up reaching \$2 billion.



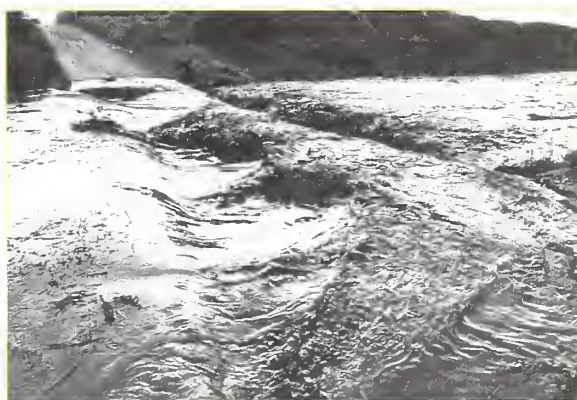
The U.S. Subcommittee for Natural Disaster Reduction (SNDR) — Under the auspices of the National Science and Technology Council and its Committee for the Environment and Natural Resources, the U.S. Subcommittee for Natural Disaster Reduction (SNDR) coordinates the work of 19 Federal agencies to reduce the impact of disasters. The SNDR issued "Natural Disaster Reduction: A Plan for the Nation" in December 1996. This plan introduces a new approach - reducing the costs of disasters before they happen by improving predictions, building disaster-resistant

structures and retrofitting existing structures, identifying hazards and their associated risks, and speeding recovery.

The SNDR developed the Natural Disaster Reduction Initiative (NDRI) to significantly reduce the costs to society and the risk of loss of human life, property, and natural resources from natural hazards. In fiscal year 1999, the Federal Emergency Management Agency, the Department of Commerce, the U.S. Department of Agriculture, and the Department of Interior will receive budget increments to advance this work. The SNDR also works with the Institute for Business and Home Safety and other private-sector partners through the Public/Private Partnership 2000 to build public awareness of natural disaster policy issues and develop public/private sector partnerships to address them.

**Global Disaster Information Network (GDIN)** — The President's fiscal year 1999 budget request included \$15 million to create the Global Disaster Information Network as part of NDRI. The primary goal is not to create another huge new government institution, but rather to leverage existing resources.

We have more information than ever before, and its sheer volume can overwhelm us. There is no process for consolidating disaster-related information that we have. A federal task force recommended a public/private partnership to create a global network that makes it easy to share accurate, timely information during all phases of



*Flash flooding: Move quickly. You may have only seconds to save yourself. Never drive into flood water. Photos courtesy of Arizona Star, Star Photo Library, Jack Schaefer.*

disaster management. NOAA, USGS, FEMA, Department of Defense and the Central Intelligence Agency would work together to create such a public/private partnership. Essential elements of the GDIN would build on existing knowledge and infrastructure by:

- Integrating and organizing information for all phases of emergency management
- Connecting the information flowing through the network
- Incorporating new and improved technologies

**Making Communities “Disaster Resistant” - FEMA’s Project Impact —**

If buildings are consistently safer and stronger, if building codes are enforced, and if communities make sound choices in planning, we can save lives, reduce property damage, and speed recovery after disasters strike.

The Federal Emergency Management Agency (FEMA) has initiated an effort to help communities protect themselves from disasters before they occur. This initiative involves working with selected high-risk communities to help them bring together all stakeholders in the community, identify the risks they face, prioritize and implement actions that can be taken to reduce those risks, and communicate their successes with others. Through this process, communities can impact day-to-day decisions and budgeting in their communities to make themselves more disaster resistant.



*This house is being elevated and retrofitted against floods. Photo courtesy of FEMA.*



*Building safer houses can help protect property from disaster damage. Photo courtesy of Jocelyn Augustino.*

Under Project Impact, no funding is available to support warning systems. However, for those Project Impact communities that identify warning as one of their priority issues, FEMA will work with them to help find ways to buy, install, and maintain NOAA Weather Radio transmitters. FEMA will also support community effort to buy and distribute receivers throughout the community, especially in critical facilities.

FEMA began working with 7 communities in 1997 through this initiative. Since then, 185 communities have signed up to participate in the initiative, with at least 2 in each State.

Individuals, businesses, and communities can take steps ahead of time to reduce their risk of loss during a disaster. In addition to constructing safer buildings and enforcing building codes, communities can, for example, retrofit structures against floods and earthquake hazards, elevate or move structures, or put shutters over windows and use hurricane straps for wind.

**FEMA's Hazard Mitigation Grant Program (HMGP)** — HMGP was created in 1988 to help States and local communities implement long-term hazard mitigation measures — such as keeping homes from being built on flood plains, engineering bridges to withstand earthquakes, creating and enforcing effective building codes to protect property from hurricanes — after a major disaster. Up to 15 percent of the FEMA's costs for the disaster may be provided to the States under this program. Under the HMGP, States may use up to 5 percent of available funds for disaster warning systems - including

the possible buying and distributing of NOAA Weather Radios - or to buy, install, and/or maintain NOAA Weather Radio transmitters.

**U.S. Geological Survey Earthquake Advances** — In addition to improving weather - and flood-related warnings over the past 10 years, we have also made tremendous strides in advance earthquake notification. Within 30 seconds after an earthquake in northern California, the U.S. Geological Survey can post the location on its Internet website. Within another few minutes, the agency has a map of anticipated damage or ground shaking.

Rapid earthquake notification is crucial in avoiding damage to transportation and electrical systems, which can be shut down immediately to avoid additional loss of life or other damage. Because standard paging units take 8 to 15 seconds, the U.S. Geological Survey has either leased lines or other direct ways of communicating with transportation and electrical systems during emergencies.

## Partnerships

Even though the Federal Government is committed to improving the hazard warnings the public receives, they can't do it alone. It will take many public and private partnerships to expand existing and find new and innovative ways to make people safer.

**NOAA Weather Radios** — Early in 1998, Vice President Al Gore taped several audio and video Public Service Announcements about the importance of NOAA Weather Radio. At the beginning of the 1998 Atlantic Hurricane season, they were distributed to radio and TV stations along the Atlantic and Gulf coast. Distribution will continue throughout the country.



*Every school should have a NOAA weather radio.*

To get NOAA Weather Radio receivers in public spaces and critical facilities, the Federal government needs the help of the state/local governments, private sector groups, and nonprofit organizations. These partnerships can encourage the purchase and donation of these receivers for public spaces, a critical need in avoiding mass casualties where people congregate - shopping centers, hospitals, elder care facilities, day care centers, police and fire stations, town halls, and concert/sporting venues.

There are already many successful examples of how this partnership approach has worked in the past.

**NOAA Weather Radio Transmitter Towers** — Since 1994, more than 100 new stations have been added using a variety of local, State, and Federal monies and public/private partnerships with corporations, electric cooperatives, and community groups. While the results are encouraging, expansion has been slow. NOAA currently has more than 500 transmitters and is working to establish an additional 300 transmitters so that these life-saving signals can be heard by more people.

**Public and Corporate Awareness** — To increase public awareness about the importance of having NOAA Weather Radios and all-hazard warnings, the Federal Government needs to partner with the companies that make these radios and develop consistent and effective public messages. Local companies and organizations have recognized the importance of these radios, and past partnerships have put NOAA Weather Radio information on grocery bags, milk cartons, newspapers, and inserts to utility bills.

The best warnings are useless unless people can take action. Continued public awareness is an integral part of the success of any warning program - whether through television station promotional efforts, public service announcements, local school visits, or other means.

**Designing New Products** — To make NOAA Weather Radios an integral part of our lives, the Federal Government needs to partner with manufacturing companies to identify, promote and market new and innovative ways to build NOAA warning information into existing products. Such designs might include a smoke detector/weather radio, self-activating TV sets that broadcast NOAA alerts, car radios that automatically tune to weather warnings, and satellite Global Positioning System (GPS) traffic/weather systems for cars and trucks.

**Communications** — To expand and upgrade telephone and mobile hazard warnings, the Federal Government needs to form partnerships with trade associations, telephone companies and service providers, paging companies, and wireless communication providers. The Federal government should also encourage uniform standards so that consistent service will be available nationwide. The Federal Government should also encourage pilot programs.

**Improved Information Content of Warnings** — Through the U.S. Weather Research Program, Federal forecast agencies will continue to work in partnership with university researchers, broadcast meteorologists, and those who use weather warnings - such as emergency managers, air traffic controllers, and pilots - to improve the timeliness and accuracy of weather warnings.



*The first NOAA Weather Radio transmitter installed under Vice President Gore's initiative covered the area in northeast Alabama that had been devastated by the 1994 Palm Sunday tornado. The Farmers Telephone Cooperative, Inc., of Rainsville, Alabama, donated tower space and standby power to make this site possible. Photo courtesy of Ed Cameron, Rural Utilities Service, USDA.*



*Blizzard conditions are dangerous and potentially life threatening.*

**National Guard** — In 1999, the National Guard completed a far-reaching study about emergency response to Weapons of Mass Destruction (WMD). The study, which was directed by Congress, is also assessing the capabilities of the EAS and NOAA Weather Radio for emergency notification of WMD risk. A partnership with the National Guard could extend the coverage of EAS to an all-hazard warning network because of the Guard's community-based presence. The National Guard also has a dual role in State and Federal emergency response, in its traditional mission to support civil authorities and in its emerging role to combat terrorism. The National Guard, NOAA, and FEMA should examine the options for interagency coordination of the EAS and the NOAA Weather Radio to support WMD preparedness.



© Greg Stumpf.

## Section 2 — Recommendations

Currently, NOAA Weather Radio is the simplest and most efficient way to warn people about impending hazards. The technological explosion of the past 10 years is fostering new and innovative ways to bring hazard warnings to the public. To reach the most people, we must use multiple distribution methods. And we must use all available technologies - both current and future - to deliver better, faster, cheaper, and more effective hazard warnings. We must ensure that the message is delivered by entering into partnerships with private industry to deliver those potential life-saving warnings. Partnerships include both standard and cell telephone services; paging; broadcast, satellite, and cable television; and emerging and developing technologies, such as “intelligent” transportation alarm systems.

To realize these goals, the Multi-Agency Working Group of Vice President Gore’s National Partnership for Reinventing Government recommends:

### 1. The Federal Government enhance the use of existing technologies.

Here’s how:

- Put NOAA Weather Radio receivers where people live, work, and gather;
  - Provide a model for the rest of the country by buying and installing NOAA Weather Radios in all federal facilities that are within range of a transmitter;
  - Include NOAA Weather Radios in new buildings;
  - Encourage donations of NOAA Weather Radios to schools, hospitals, public facilities, community centers, day care centers, places of worship, and other places where people gather;
  - Encourage more “customer-friendly” designed combinations of weather radios and other common radio receivers;
  - Increase public awareness about NOAA Weather Radios;
  - Expand and enhance the coverage and transmission capacity of the existing NOAA Weather Radio system; and
  - Use the existing NOAA system as the backbone of a National all-hazard warning network.
- ### 2. The Vice President should direct the Multi-Agency Working Group to:
- Ensure that the emergency alert system keeps pace with technological advances;
  - Identify ways to improve warnings; and
  - Identify ways to refine the hazard warning network.

See Appendix for specifics of recommendations.



# Appendix

## Specifics of Recommendations:

### **1. The Federal Government should enhance the use of existing technologies. Here's how:**

- Put NOAA Weather Radio receivers where people live, work, and gather.

Who can put a price tag on a human life? We have a tremendous opportunity to save lives and prevent human injury and suffering by warning people about coming disasters.

The Federal Government can play a valuable leadership role in encouraging people, businesses, and communities to buy and put NOAA Weather Radio receivers where they would be most effective. Such an effort is clearly needed. Despite ample evidence that warnings save lives, only 1 in every 10 homes (6 percent) now has receivers. The percentages are even lower for businesses and public areas like schools, public facilities, apartment buildings, manufactured housing parks, community centers, elder care facilities, day care centers, hospitals, places of worship, and public sporting and concert events.

- Provide a model for the rest of the country by buying and installing NOAA Weather Radios in all Federal facilities within range of a transmitter.

In addition to having the Federal Government lead the rest of the Nation by example, this would protect the lives of about 230,000 Federal employees at a cost of less than \$100 per facility with a minimal fiscal impact on the Federal Government.

- Put NOAA Weather Radios in new buildings.

Including NOAA Weather Radio receivers in new building construction would save lives by vastly improving the warnings to those who live, work, or gather there. NOAA, FEMA, and HUD should work with the homebuilders, manufactured housing builders, and state and



*USDA Photo.*

local governments to encourage making these low-cost receivers a standard in new homes and buildings.

- Encourage donations of NOAA Weather Radios to schools, hospitals, public facilities, community centers, day care centers, and other places where people gather.

Partnerships have already succeeded in getting NOAA Weather Radios donated to schools and other public facilities, but there are still many critical public facilities that lack an early warning system, including schools, hospitals, community centers, elder care facilities, day care facilities and others. By creating partnerships with state/local governments, private sector groups, and non-profit organizations, the Federal Government can continue to encourage donations. The primary cost of this approach at the Federal level is in staff time that is needed to work with partner groups.

- Encourage more “customer friendly” design combinations of weather radios and other common radio receivers.

New technology combinations would make NOAA Weather Radios more attractive to consumers. They would also make it easier to incorporate the devices they use every day, making it seem less like an unnecessary expense. The Federal government should work with manufacturers of NOAA Weather Radios to create more “customer-friendly” designs - a joint weather radio and smoke detector; and television sets - that self-activate to broadcast weather and hazard alerts. Another design might be car radios that automatically tune to local weather warning signals when they are issued. Cars in Germany already do this.

- Increase public awareness about NOAA Weather Radios.

The Vice President has already made several public service announcements about the importance of NOAA Weather Radios. Other Federal agencies should help intensify this public awareness campaign. By combining the efforts of all of these agencies, the Federal Government can more clearly focus the message on safety, affordability, and benefits. We should also more closely coordinate with the manufacturers of the receivers through the use of partnerships, to the extent possible.

In addition, NOAA Weather Radio staff should conduct social research about why people do and do not buy weather radios, and should develop a communications strategy to complement private sector efforts aimed at marketing innovative products.



*USDA Photo.*

- Expand and enhance the coverage and transmission capacity of the existing NOAA Weather Radio system.

Current computer projections estimate that NOAA Weather Radio signals currently cover 90 percent of the U.S. population. However, actual coverage may be between 80 and 85 percent. We should add enough transmission towers to reach at least 95 percent of the population.

- Use the existing NOAA system as the backbone of an all-hazard warning system.

The system of the future should include warnings for tornadoes, thunderstorms, tsunamis, wild fires, flash floods, hurricanes, winter storms, volcanic eruptions, earthquakes, hazardous materials, space weather, chemical spills, terrorist incidents, civil unrest, and landslides.

## **2. The Vice President should direct the Multi-Agency Working Group to:**

- Ensure that the emergency alert system keeps pace with technological advances.

We should embrace new technology by encouraging and incorporating standards transmission and equipment capacity. All broadcasters and large wired cable systems must have EAS equipment. By October 1, 2002, all cable systems (both wired and wireless) must have EAS equipment. These systems must all interface: Television and radio broadcast licensees and receiver manufacturers; computer software and hardware developers; wireless and wireless telephone service providers and equipment; paging and wired and wireless cable systems. In addition, State and local emergency managers need to have Specific Area Message Encoding (SAME)/EAS equipment that interfaces with NOAA and with broadcast stations and cable systems.

- Identify ways to improve warnings.

Improved warnings can both save lives and benefit the economy. More specific warnings would improve “miss” and “false alarm” rates, extend the warning times and better target the message.

The National Weather Service continues to increase the lead times and improve the accuracy of warnings. As we begin to better understand the physical processes involved, we can continue to improve the accuracy of weather warnings.

Lead times for tornado warnings have improved from less than 5 minutes 10 years ago to 12 minutes or more today. Warning times for flash floods have also increased dramatically. Ten years ago, the public had about 9 minutes of lead time before a flash flood. Today, the NWS warns for flash flooding about 55 minutes before the event. Through

---

the U.S. Weather Research Program, the NWS works in partnership with other Federal agencies (NASA, NSF, and the Navy), scientists from dozens of universities, broadcast meteorologists, and others to build on those successes and make further improvements in weather and flood forecasting.

- Identify ways to refine the hazard warning network.

In a letter to the FCC, dated October 20, 1999, Vice President Al Gore urged the Commission to address the issue of disaster warnings in the digital age in a public proceeding. Specifically, the Vice President suggested that the Commission, in conjunction with the NPR, “spearhead this collaborative effort to identify ways to refine our hazard warning network.” This Multi-Agency Working Group can facilitate this collaborative effort and ensure that disaster warning systems keep pace with technological advances.

**Specific goals the Department of Commerce has set for 2004:**

- Double hurricane watch lead time to 2 days
- Better target the coastline area to be evacuated to reduce the area to be warned by 50 percent (saving an average of \$200 million a year in evacuation costs)
- Reduce the area of “surge” evacuation
- Increase forecast lead time for the onset of gale and hurricane force winds by one day
- Reduce the inland flooding forecast error by 50 percent
- Extend the range of weather forecasting skill by 2 full days
- Increase the lead time of flash flood warnings to 60 minutes



## **Internet Sites:**

Earthquakes: <http://www.usgs.gov>

Emergency Managers Weather Information Network:  
<http://iwin.nws.noaa.gov>

Federal Communications Commission's EAS:  
<http://www.fcc.gov/cib/eas>

Federal Emergency Management Agency:  
<http://www.fema.gov>

NOAA Weather Radio coverage:  
<http://www.nws.noaa.gov/nwr>

Questions and answers about NOAA Weather Radio:  
<http://www.nws.noaa.gov/pa/secnews/nwr/nwfaq.htm>

National Climatic Data Center: <http://ncdc.noaa.gov>

Natural Hazards Center, University of Colorado:  
<http://www.Colorado.EDU/hazards/infosource1/infosource1.html>

National Hurricane Center: <http://www.nhc.noaa/om>

National Telecommunications and Information Administration:  
<http://www.ntia.doc.gov>

National Weather Service: <http://www.nws.noaa.gov>

Personal Communications Industry Association: <http://www.pcia.com>

Tornado and other storm prediction: <http://www.ncep.noaa.gov>

U.S. Department of Agriculture: <http://www.usda.gov>

Weather and flood information: <http://iwin.nws.noaa.gov>

## Companies That Manufacture or Market NOAA Weather Radios:

The U.S. Government does not endorse any particular make or model of receiver. This list, which contains many of the NOAA Weather Radio/EAS receiver manufacturers and suppliers, is intended to illustrate the variety of products currently available. As each receiver is unique and has multiple features, buyers should determine which receiver best meets their particular needs. They should purchase the receiver only under the condition that it can be returned if it doesn't work at their location.

**Standard NOAA Weather Radio** (Receives only NWR broadcasts with alarms for all watches and warnings): Cherokee Electronics, Communistar, Inc., Computer Automation Technology, First Alert, Hamtronics, Homesafe, Inc., Maxon, Midland, MTS Communications, Oregon Scientific, Radio Shack, Reach Electronics, SunMate, Weatherman Alert, and TMC, Inc.

**NOAA Weather Radio with Specific Area Message Encoding (SAME)** (Receives only NWR broadcasts with programmable alarms for specific areas and specific watch and warning events): Alert Products, Cherokee Electronics, First Alert, Gorman-Redlich, Homesafe, INH Technology, MTS Communications, Oregon Scientific, Radio Shack, Thunder Eagle, and Weatherman Alert.

**Consumer Products** (multi-purpose electronics, AM/FM receivers, clock radios, AM/FM/TV band receivers, and AM/FM/cassette players): Cherokee Electronics, General Electric, Grundig, Midland, Motorola, Oregon Scientific, Radio Shack, Sony, C.C. Crane, Remington, Sunmate, Wilson Sporting Goods, and Zenith.

**Marine:** Apelco, Cobra, Garmin, Humminbird, ICOM, Radio Shack, Ranger, Raytheon, Ross, Shakespeare, Standard, Uniden, and West Marine.

**CB:** Cobra, General Electric, Maxon, Midland, Radio Shack, Uniden.

**Scanner:** Radio Shack, Uniden.

**Automotive:** Audiovox, BMW, Cadillac, Clarion, Denon, Land Rover, Mercedes, Panasonic, Saab, and Suzuki.

**Cable TV:** Hollyanne.

**Aviation:** Bendix/King, ICOM, and Yaesu.

**Emergency Alert** (primarily for commercial use): ASI, DataRadio, Earth Alert, Federal Warning Systems, Hollyanne, Sage, TFT, Thunder Eagle, and Weather Warning Systems.

Receivers are available at many retail stores that carry electronic equipment, auto radios, marine supplies, and sports equipment. They are also available at office supply stores, truck stops, on cable shopping networks, on the Internet, in specialty catalogs, from auto dealers, and directly through newspaper and magazine ads.



 **Publications:**

“Charting the Digital Broadcasting Future: Final report of the Advisory Committee on Public Interest Obligations of Digital Television Broadcasters,” Advisory Committee on Public Interest Obligations of Digital Television Broadcasters, 1998. Website: [www.ntia.doc.gov/pubintadvcom.pubint.htm](http://www.ntia.doc.gov/pubintadvcom.pubint.htm).

“Natural Disaster Reduction Plan for the Nation,” National Science and Technology Council Committee on Environment and Natural Resources’ Subcommittee on Natural Reduction, December 1996.

“Effective Disaster Warnings,” Working Group on Natural Disaster Information Systems, Subcommittee on Natural Disaster Reduction Committee on Environmental and Natural Resources, Office of Science Technology Policy, draft copy, 1998.

“Harnessing Information and Technology for Disaster Management,” Disaster Information Task Force Report, November 1997.

“Taking Shelter From the Storm: Building a Safe Room Inside Your House,” Federal Emergency Management Agency, Mitigation Directorate, October 1998.

“National Guard Bureau Report to Congress: Embracing the National Guard’s Readiness to Support Emergency Responses in Domestic Chemical and Biological Terrorism Defense,” National Guard, July 1999.

ROAD  
CLOSED



## List of Acronyms:

CFR	Code of Federal Regulations
CIA	Central Intelligence Agency
DOC	U.S. Department of Commerce
DOT	U.S. Department of Transportation
EMWIN	Emergency Managers Weather Information Network
EAS	Emergency Alert System
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
GOES	Geostationary Operational Environmental Satellites
GPS	Global Positioning System
GSA	U.S. General Services Administration
HMGP	Hazard Mitigation Grant Program
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration, an agency of the U.S. Department of Commerce
NDIS	National Disaster Information System
NDRI	Natural Disaster Reduction Initiative
NPR	National Partnership for Reinventing Government
NSF	National Science Foundation
NTIA	National Telecommunications and Information Administration, an agency of the U.S. Department of Commerce
NWR	NOAA Weather Radio
NWS	National Weather Service, an agency of the U.S. Department of Commerce
OMB	Office of Management and Budget
OSTP	Office of Science and Technology Policy
PCS	Personal Communications Service
RUS	Rural Utilities Services, an agency of the U.S. Department of Agriculture
SAME	Specific Area Message Encoding
SNDR	U.S. Subcommittee on Natural Disaster Reduction
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey



## **Acknowledgments:**

### **Multi-Agency Working Group Members:**

Eric Anderson, Office of the Vice President  
Vincent Brown, FEMA  
Ed Cameron, USDA, RUS  
Anthony Haynes, USDA, RUS  
Marci Hilt, USDA, Office of Communications  
Stewart Levy, GSA  
Jeng Fen Mao, NTIA  
Ken Putkovich, NWS  
John Sokich, NWS  
George Wilcox, NOAA

### **Special Thanks To:**

Steve Butterfield, NPR  
Robert Coullahan, SAIC  
Eva Cuevas, USDA, Design Center  
Gary Fairgrieve, USGS  
Joe Gattuso, NTIA  
William Hooke, NOAA  
Julie Olson, USDA, Design Center  
Elaine Padovani, OSTP  
Barry Reichenbaugh, NWS  
Mark Reichert, NPR  
Drew Sachs, FEMA  
Barbara Smedo, NOAA  
Susan Valaskovic, NPR  
Morley Winograd, NPR  
Jennifer Wagner, OMB

---

December 1999

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.



# What To Do In An Emergency

*By the time you finish reading this page, the National Weather Service can give you enough warning to keep you from being killed or injured. Here's what you should do after you receive a hazard warning:*

## For a Tornado:

**At home:** Go to the lowest level of the building. If there is no basement, go to an inner hallway or small interior room with no windows, such as a bathroom or closet. Get away from windows. Go to the center of the room; corners attract debris.



**In a large building:** Go to the basement or an inside hallway on the lowest level. Stay away from auditoriums, cafeterias, large hallways, and other places with wide-span roofs.

Get under a piece of sturdy furniture - a desk, table, workbench - and hold on to it. Put your arms over your head and neck.

If you are in a mobile home, find shelter elsewhere.

**Outdoors:** Try to get inside. If that isn't possible, lie in a ditch or a low-lying area, or crouch near a large building. Protect your head and neck.

Never try to out-drive a tornado. Get out of the car immediately. Take shelter in a nearby building. If you can't get to a building, get out of the car and lie in a ditch or low-lying area.

## For a Flash Flood:

Move quickly, you may have only SECONDS to save yourself after you receive a flash flood WARNING.



**Indoors:** If you are told to evacuate, leave immediately. Go to higher ground. Climb to safety.

**Outdoors:** Climb to higher ground. Be especially cautious at night. Avoid walking through floodwater. Swiftly moving water even 6 inches deep can sweep you off your feet.

Don't drive into floodwater. If you come to a flooded area, turn around and go another way. The roadbed may not be intact. If your car stalls, abandon it immediately and climb to higher ground. Many people have died while trying to move stalled cars.

## For an Earthquake:

**Indoors:** Take cover under a piece of heavy furniture, under a sturdy door frame, or against an inside wall and hold on. Stay inside. Do not try to leave while the building is shaking, because objects can fall on you.

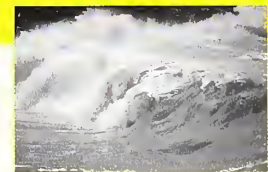


**Outdoors:** Move into the open, away from buildings, street lights, and utility wires. Stay in the open until the shaking stops.

Stop driving and stay inside your vehicle. If possible, drive to a clear area away from buildings, trees, overpasses, or utility wires. When the shaking has stopped, drive only with caution. Avoid bridges or ramps that might have been damaged.

## For a Tsunami:

Listen to the radio or TV to get the latest information. Be ready to evacuate. If you hear an official tsunami warning, evacuate immediately. Climb to higher ground.



Stay away from the beach. Never go to the beach to watch a tsunami come in. If you can see the wave, you are too close.

Don't assume one wave means the danger is over. The next wave may be larger than the first. Do not return home until authorities say it is safe.

For more information, see Internet sites in the appendix.

\* NATIONAL AGRICULTURAL LIBRARY



1022513775